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MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

Spectral Gamma-Ray Borehole
Log Data Report

Log Event A

Borehole # 40-09-09

Borehole Information

Farm : S	**Tank :** S-109	**Site Number :** 299-W23-167
N-Coord : 36,038	**W-Coord :** 75,912	**TOC Elevation :** 663.06
Water Level, ft :	**Date Drilled :** 10/31/1971	

Casing Record

Type : Steel-welded	Thickness : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 140	

Borehole Notes:
This borehole was drilled during October 1971 and completed to a depth of 100 ft with 6-in.-diameter casing. The borehole was deepened to 140 ft in May 1973. The driller's log contains no mention of perforations or grout; therefore, it is assumed that the borehole was not perforated or grouted. The casing thickness is assumed to be 0.280 in., on the basis of published thickness for schedule-40, 6-in. casing. The zero reference for the SGLS logs is the top of the casing, which is even with the ground surface.

Equipment Information

Logging System : 1	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 04/1996	**Calibration Reference :** GJPO-HAN-5	**Logging Procedure :** P-GJPO-1783

Log Run Information

Log Run Number : 1	**Log Run Date :** 07/17/1996	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 0.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 46.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Log Run Number : 2	**Log Run Date :** 07/18/1996	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 138.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 45.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Log Event A

Borehole 40-09-09

Analysis Information

Analyst : D.L. Parker

Data Processing Reference : P-GJPO-1787 Analysis Date : 04/01/1997

Analysis Notes :

This borehole was logged in two log runs using a centralizer. The pre- and post-survey field verification spectra met the acceptance criteria established for peak shape and system efficiency. The energy and peak-shape calibration from the field verification spectra that best matched the data were used to establish the channel-to-energy parameters used in processing the spectra acquired during the log runs.

Casing correction factors for a 0.280-in.-thick casing were applied during the analysis.

Cs-137 was the only man-made radionuclide detected in this borehole. Cs-137 contamination was detected at the ground surface, 2 ft, and 2.5 ft. The maximum Cs-137 concentration detected was about 0.3 pCi/g at a depth of 2 ft. A higher apparent concentration was detected at the ground surface, but this concentration was not an actual concentration because the borehole-to-detector geometry at the ground surface does not match the source-to-detector geometries used for calibration.

The logs of the naturally occurring radionuclides show an increase K-40 concentrations at a depth of about 51 ft. KUT concentrations decrease in the depth interval from 59 to 61 ft. An increase in KUT concentrations was detected at a depth of about 66 ft. The K-40 concentrations decrease and U-238 and Th-232 concentrations increase at a depth of about 123 ft.

The SGLS total count log plot reflects the log plots of the man-made and naturally occurring radionuclides.

Details concerning the interpretation of data for this borehole are presented in the Tank Summary Data Report for tank S-109.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.